

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	§	Confirmation No. 3148
Fischer	§	
	§	Group Art Unit: 3752
Patent No.: 7,165,624 B1	§	
	§	Examiner: D. Nguyen
Issued: January 23, 2007	§	
	§	
Serial No.: 09/292152	§	
	§	
Filed: April 15, 1999	§	
	§	
For: EARLY SUPPRESSION FAST	§	
RESPONSE FIRE	§	
PROTECTION SPRINKLER	§	

Certificate of Correction Branch
Commissioner for Patents
Washington, D.C. 20231

**REQUEST FOR
EXPEDITED CERTIFICATE OF CORRECTION UNDER 37 CFR 1.322**

In accordance with MPEP 1480.1, Patentee's Assignee (hereinafter "Assignee") of the above-identified patent respectfully submits this Request for Expedited Issuance of Certificate of Correction (hereinafter "Request"). Attached is a Certificate of Correction form PTO/SB/44 showing the text of the corrections. Included in the corrections, are allowed claims to be added and published as claims 90-121. Claims 90-121 were originally filed as claims 106-137. Attached herewith is the Issue Information Sheet (Exhibit A), signed by the Examiner on August 17, 2006, showing the allowed claims 106-137 renumbered as claims 90-121.

Assignee submits that the errors necessitating the Request are solely attributable to the Office. In support, attached is a copy of the "Amendment and Accompanying Request for Continued Examination" filed May 9, 2006 (Exhibit B), and a copy of the Notice of Allowance dated August 25, 2006 (Exhibit C) indicating the allowed claims were claims 2-20 and 36-137 as provided on the enclosed Amendment.

If a Certificate of Correction is deemed inappropriate in form to correct the identified errors, Assignee respectfully requests issuance of a corrected patent in lieu thereof pursuant to 37 CFR 1.322 (b).

Respectfully submitted,



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EXHIBIT A

EXHIBIT B

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Date May 9, 2006 Attorney Docket No. 16125:E-US

Fax Transmittal

Total Pages (Including Cover) 44

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To: U.S. PATENT & TRADEMARK OFFICE

Fax No.: 571-273-8300

Message

OFFICIAL COMMUNICATION

RE: U.S. Application No. 09/292,152
Filing Date: April 15, 1999
First Named Inventor: Michael A. Fischer
Art Unit: 3752
Examiner: Nguyen, Dinh Q.

SUBMITTED PAPERS:

-CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8 FORM PTO/SB/97 (1 page)

-TRANSMITTAL FORM PTO/SB/21 (1 page)

-FEE TRANSMITTAL FORM PTO/SB/17 (1 page)

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL (1 page)

AMENDMENT AND ACCOMPANYING REQUEST FOR CONTINUED EXAMINATION (39 pages)

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on May 9, 2006
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53,964

202-416-6800

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IDENTIFIED SUBMITTED PAPERS RE: APPLN NO. 09/292,152:

-TRANSMITTAL FORM PTO/SB/21 (1 page)

-FEE TRANSMITTAL FORM PTO/SB/17 (1 page)

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL (1 page)

-AMENDMENT (39 pages)

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to be (and by the USPTO to process) an application. Confidentiality is governed by 36 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1.6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22315-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22315-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

TRANSMITTAL FORM

Application Serial Number	09/292,152
Filing Date	April 15, 1999
First Named Inventor	Michael A. Fischer.
Group Art Unit	3752
Examiner Name	NGUYEN, Dinh Q.
Attorney Docket No.	16125-E-US
Patent No.	Not applicable
Issue Date	Not applicable

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ENCLOSURES (check all that apply)

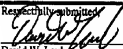
<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Check Attached <input type="checkbox"/> Copy of Fee Transmittal Form <input checked="" type="checkbox"/> Amendment/Response <input type="checkbox"/> Preliminary <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Letter to Official Draftsperson including Drawings [Total Sheets ____] <input type="checkbox"/> Petition for Extension of Time () <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Form PTO-1449 <input type="checkbox"/> Copies of IDS Citations <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Sequence Listing submission <input type="checkbox"/> Paper Copy/CD <input type="checkbox"/> Computer Readable Copy <input type="checkbox"/> Statement verifying identity of above	<input type="checkbox"/> Copy of Notice to File Missing Parts of Application (PTO-1553) <input type="checkbox"/> Formal Drawing(s) <input type="checkbox"/> Request For Continued Examination (RCE) Transmittal <input type="checkbox"/> Power of Attorney (Revocation of Prior Powers) <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Executed Declaration and Power of Attorney for Utility or Design Patent Application <input type="checkbox"/> Small Entity Statement <input type="checkbox"/> CD(s) for large table or computer program <input type="checkbox"/> Amendment After Allowance	<input type="checkbox"/> Request for Certificate of Correction <input type="checkbox"/> Certificate of Correction (in duplicate) <input type="checkbox"/> Notice of Appeal to Board of Patent Appeals and Interferences <input type="checkbox"/> Appeal Brief (in triplicate) <input type="checkbox"/> Status Inquiry <input type="checkbox"/> Return Receipt Postcard <input type="checkbox"/> Certificate of Facsimile Transmission under 37 C.F.R. 1.8 <input checked="" type="checkbox"/> Additional Enclosure(s) (please identify below) Request for Continued Examination (RCE) Transmittal
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(73434-009US)

Docket No.: 16125:E-US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael A. FISCHER)	Confirmation No: 3148
)	
Application No.: 09/292,152)	Group Art Unit: 3752
)	
Filed: April 15, 1999)	Examiner: D. Nguyen
)	
For: EARLY SUPPRESSION FAST RESPONSE)	
FIRE PROTECTION SPRINKLER)	

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**AMENDMENT AND ACCOMPANYING
REQUEST FOR CONTINUED EXAMINATION**

Sir:

Prior to the continued examination of the above-identified application on the merits, please amend the application as follows:

73434-009US

IN THE CLAIMS:

Claim 1. (Canceled)

Claim 2. (Previously Presented): An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 25 feet in a storage area having a maximum ceiling height of 30 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 and a minimum design flowing pressure of about 15 pounds per square inch, and less than about 40 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 3. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 2, 36, 37, or 38, wherein said reentrant slots extend inwardly along reentrant slot centerlines, and each of said reentrant slots has a first width transverse to its reentrant slot centerline in a region of said peripheral edge and a second slot width transverse

to its reentrant slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, said second width being greater than said first width.

Claim 4. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 3, further comprising an apex element and wherein said deflector is mounted to said apex element and wherein an innermost portion of each of said reentrant slots extends inwardly toward said deflector axis to be no further outward from said deflector axis than an outermost surface of said apex element.

Claim 5. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 4, wherein said innermost portions of said reentrant slots extend inwardly toward said deflector axis to underlie said apex element, relative to fluid flow direction from said outlet.

Claim 6. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 3, wherein said reentrant slot centerlines extend radially outward from said deflector axis.

Claim 7. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 2, 36, 37, or 38, wherein said sprinkler is suited for installation with said deflector disposed up to 18 inches below a ceiling.

Claim 8. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 2, 36, 37 or 38, wherein said deflector has a thickness measured from said first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 9. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 2, 36, 37, or 38, wherein said reentrant slots comprise a plurality of reentrant slots, said plurality of reentrant slots comprising at least a first type of reentrant slots and a second type of reentrant slots,

reentrant slots of said first type extending from said first surface through said deflector with the slot openings at an outer peripheral edge of said deflector body, each of said reentrant slots of said first type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a first type length,

reentrant slots of said second type extending through said deflector from said first surface, with the slot openings at said peripheral edge of said deflector body, each of said reentrant slots of said second type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a second type length, and

the innermost portions of said reentrant slots of said first type extending inwardly toward said deflector axis to be no further outward from said deflector axis than the outermost surface of said apex element.

Claim 10. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein:

each of said reentrant slots of said first type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said first type slots being greater than the first said width of said first type slots, and

each of said reentrant slots of said second type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said second type slots being greater than the first said width of said second type slots.

Claim 11. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said first type length is equal to or greater than said second type length.

Claim 12. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 11, wherein said reentrant slot centerlines of said reentrant slots of said first type extend substantially radially outward from said deflector axis.

Claim 13. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 12, wherein said reentrant slot centerlines of said reentrant slots of said second type extend substantially radially outward from said deflector axis.

Claim 14. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said reentrant slots of said first type comprise at least two pairs of generally opposing reentrant slots.

Claim 15. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said reentrant slots of said second type comprise at least two pairs of generally opposing reentrant slots.

Claim 16. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said first type length of said reentrant slots of said first type is substantially the same.

Claim 17. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said second type length of said reentrant slots of said second type is substantially the same.

Claim 18. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said reentrant slots of said first type define reentrant portions having an elongated shape.

Claim 19. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein said reentrant slots of said second type define reentrant portions having a pear-shape.

Claim 20. (Original) The early suppression fast response pendent-type fire protection sprinkler of claim 9, wherein a reentrant slot of said second type is located between reentrant slots of said first type.

Claim 21. Claims 21-35 (Canceled)

Claim 36. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, said sprinkler having a K-factor

of about 25 and a minimum design flowing pressure of about 20 pounds per square inch, and less than about 45 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 37. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 and a minimum design flowing pressure of about 25 pounds per square inch, and less than about 50 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector

inwardly from said peripheral edge toward said deflector axis.

Claim 38: (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 and a minimum design flowing pressure of about 40 pounds per square inch, and less than about 65 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 39: (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 25 feet in a storage area having a maximum ceiling height of 30 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 or more and a minimum design flowing pressure of about 15 pounds per square inch,

and less than about 40 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 40. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 or more and a minimum design flowing pressure of about 20 pounds per square inch, and less than about 45 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 41. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 or more and a minimum design flowing pressure of about 25 pounds per square inch, and less than about 50 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 42. (Previously Presented): An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, said sprinkler having a K-factor of about 25 or more and a minimum design flowing pressure of about 40 pounds per square inch, and less than about 65 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 43. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 39, 40, 41, or 42, wherein said reentrant slots extend inwardly along reentrant slot centerlines, and each of said reentrant slots has a first width transverse to its reentrant slot centerline in a region of said peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, said second width being greater than said first width.

Claim 44. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 43, further comprising an apex element and wherein said deflector is mounted to said apex element and wherein an innermost portion of each of said reentrant slots extends inwardly toward said deflector axis to be no further outward from said deflector axis than an outermost surface of said apex element.

Claim 45. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 44, wherein said innermost portions of said reentrant slots extend inwardly toward said deflector axis to underlie said apex element, relative to fluid flow direction from said outlet.

Claim 46. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 43, wherein said reentrant slot centerlines extend radially outward from said deflector axis.

Claim 47. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 39, 40, 41, or 42, wherein said sprinkler is suited for installation with said deflector disposed up to 18 inches below a ceiling.

Claim 48. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 39, 40, 41, or 42, wherein said deflector has a thickness measured from said first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 49. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 39, 40, 41, or 42, wherein said reentrant slots comprise a plurality of reentrant slots, said plurality of reentrant slots comprising at least a first type of reentrant slots and a second type of reentrant slots,

reentrant slots of said first type extending from said first surface through said deflector with the slot openings at an outer peripheral edge of said deflector body, each of said reentrant slots of said first type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a first type length,

reentrant slots of said second type extending through said deflector from said first surface, with the slot openings at said peripheral edge of said deflector body, each of said reentrant slots of said second type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a second type length, and

the innermost portions of said reentrant slots of said first type extending inwardly toward said deflector axis to be no further outward from said deflector axis than the outermost surface of said apex element.

Claim 50. Claim 50 (Previously Presented): The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein:

each of said reentrant slots of said first type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said first type slots being greater than the first said width of said first type slots, and

each of said reentrant slots of said second type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said second type slots being greater than the first said width of said second type slots.

Claim 51. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said first type length is equal to or greater than said second type length.

Claim 52. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 51, wherein said reentrant slot centerlines of said reentrant slots of said first type extend substantially radially outward from said deflector axis.

Claim 53. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 52, wherein said reentrant slot centerlines of said reentrant slots of said second type extend substantially radially outward from said deflector axis.

Claim 54. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said reentrant slots of said first type comprise at least two pairs of generally opposing reentrant slots.

Claim 55. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said reentrant slots of said second type comprise at least two pairs of generally opposing reentrant slots.

Claim 56. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said first type length of said reentrant slots of said first type is substantially the same.

Claim 57. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said second type length of said reentrant slots of said second type is substantially the same.

Claim 58. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said reentrant slots of said first type define reentrant portions having an elongated shape.

Claim 59. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein said reentrant slots of said second type define reentrant portions having a pear-shape.

Claim 60. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 49, wherein a reentrant slot of said second type is located between reentrant slots of said first type.

Claim 61. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 25 feet in a storage area having a maximum ceiling height of 30 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 15 pounds per square inch, and less than about 40 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 62. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, said sprinkler having a

minimum design flowing pressure of about 20 pounds per square inch, and less than about 45 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 63. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 25 pounds per square inch, and less than about 50 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 64. (Previously Presented) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 40 pounds per square inch, and less than about 65 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 65. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 61, 62, 63, or 64, wherein said reentrant slots extend inwardly along reentrant slot centerlines, and each of said reentrant slots has a first width transverse to its reentrant slot centerline in a region of said peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, said second width being greater than said first width.

Claim 66. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 65, further comprising an apex element and wherein said deflector

is mounted to said apex element and wherein an innermost portion of each of said reentrant slots extends inwardly toward said deflector axis to be no further outward from said deflector axis than an outermost surface of said apex element.

Claim 67. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 66, wherein said innermost portions of said reentrant slots extend inwardly toward said deflector axis to underlie said apex element, relative to fluid flow direction from said outlet.

Claim 68. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 65, wherein said reentrant slot centerlines extend radially outward from said deflector axis.

Claim 69. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 61, 62, 63, or 64, wherein said sprinkler is suited for installation with said deflector disposed up to 18 inches below a ceiling.

Claim 70. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 61, 62, 63, or 64, wherein said deflector has a thickness measured from said first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 71. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 61, 62, 63, or 64, wherein said reentrant slots comprise a plurality of reentrant slots, said plurality of reentrant slots comprising at least a first type of reentrant slots and a second type of reentrant slots,

reentrant slots of said first type extending from said first surface through said deflector with the slot openings at an outer peripheral edge of said deflector body, each of said reentrant slots of said first type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a first type length,

reentrant slots of said second type extending through said deflector from said first surface, with the slot openings at said peripheral edge of said deflector body, each of said reentrant slots of said second type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a second type length, and

the innermost portions of said reentrant slots of said first type extending inwardly toward said deflector axis to be no further outward from said deflector axis than the outermost surface of said apex element.

Claim 72. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein:

each of said reentrant slots of said first type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said first type slots being greater than the first said width of said first type slots, and

each of said reentrant slots of said second type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said second type slots being greater than the first said width of said second type slots.

Claim 73. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said first type length is equal to or greater than said second type length.

Claim 74. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 73, wherein said reentrant slot centerlines of said reentrant slots of said first type extend substantially radially outward from said deflector axis.

Claim 75. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 74, wherein said reentrant slot centerlines of said reentrant slots of said second type extend substantially radially outward from said deflector axis.

Claim 76. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said reentrant slots of said first type comprise at least two pairs of generally opposing reentrant slots.

Claim 77. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said reentrant slots of said second type comprise at least two pairs of generally opposing reentrant slots.

Claim 78. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said first type length of said reentrant slots of said first type is substantially the same.

Claim 79. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said second type length of said reentrant slots of said second type is substantially the same.

Claim 80. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said reentrant slots of said first type define reentrant portions having an elongated shape.

Claim 81. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein said reentrant slots of said second type define reentrant portions having a pear-shape.

Claim 82. (Previously Presented) The early suppression fast response pendent-type fire protection sprinkler of claim 71, wherein a reentrant slot of said second type is located between reentrant slots of said first type.

Claim 83. (Previously Presented) An early suppression fast response fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 25 feet in a storage area having a maximum ceiling height of 30 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 15 pounds per square inch, and less than about 40 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots

extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 84. (Previously Presented) An early suppression fast response fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 20 pounds per square inch, and less than about 45 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 85. (Previously Presented) An early suppression fast response fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, said sprinkler having a minimum design

flowing pressure of about 25 pounds per square inch, and less than about 50 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 86. (Previously Presented) An early suppression fast response fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231 C, to protect single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, said sprinkler having a minimum design flowing pressure of about 40 pounds per square inch, and less than about 65 pounds per square inch, at the most hydraulically remote sprinkler, and further comprising:

a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and

a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

Claim 87. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 83, 84, 85, or 86, wherein said reentrant slots extend inwardly along reentrant slot centerlines, and each of said reentrant slots has a first width transverse to its reentrant slot centerline in a region of said peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, said second width being greater than said first width.

Claim 88. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 87, further comprising an apex element and wherein said deflector is mounted to said apex element and wherein an innermost portion of each of said reentrant slots extends inwardly toward said deflector axis to be no further outward from said deflector axis than an outermost surface of said apex element.

Claim 89. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 88, wherein said innermost portions of said reentrant slots extend inwardly toward said deflector axis to underlie said apex element, relative to fluid flow direction from said outlet.

Claim 90. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 87, wherein said reentrant slot centerlines extend radially outward from said deflector axis.

Claim 91. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 83, 84, 85, or 86, wherein said sprinkler is suited for installation with said deflector disposed up to 18 inches below a ceiling.

Claim 92. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 83, 84, 85, or 86, wherein said deflector has a thickness measured from said first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 93. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 83, 84, 85, or 86, wherein said reentrant slots comprise a plurality of reentrant slots, said plurality of reentrant slots comprising at least a first type of reentrant slots and a second type of reentrant slots,

reentrant slots of said first type extending from said first surface through said deflector with the slot openings at an outer peripheral edge of said deflector body, each of said reentrant slots of said first type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a first type length,

reentrant slots of said second type extending through said deflector from said first surface, with the slot openings at said peripheral edge of said deflector body, each of said reentrant slots of said second type extending inwardly from said peripheral edge, along the reentrant slot centerlines, generally toward said deflector axis, to a second type length, and

the innermost portions of said reentrant slots of said first type extending inwardly toward said deflector axis to be no further outward from said deflector axis than the outermost surface of said apex element,

Claim 94. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein:

each of said reentrant slots of said first type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline

in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said first type slots being greater than the first said width of said first type slots, and

each of said reentrant slots of said second type has a first width transverse to its slot centerline in a region of said peripheral edge and a second width transverse to its slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, the second said width of said second type slots being greater than the first said width of said second type slots.

Claim 95. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said first type length is equal to or greater than said second type length.

Claim 96. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 95, wherein said reentrant slot centerlines of said reentrant slots of said first type extend substantially radially outward from said deflector axis.

Claim 97. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 96, wherein said reentrant slot centerlines of said reentrant slots of said second type extend substantially radially outward from said deflector axis.

Claim 98. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said first type comprise at least two pairs of generally opposing reentrant slots.

Claim 99. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said second type comprise at least two pairs of generally opposing reentrant slots.

Claim 100. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said first type length of said reentrant slots of said first type is substantially the same.

Claim 101. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said second type length of said reentrant slots of said second type is substantially the same.

Claim 102. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said first type define reentrant portions having an elongated shape.

Claim 103. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said second type define reentrant portions having a pear-shape.

Claim 104. (Previously Presented) The early suppression fast response fire protection sprinkler of claim 93, wherein a reentrant slot of said second type is located between reentrant slots of said first type.

Claim 105. (Currently Amended) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from ~~of about~~ 15 pounds per square inch to ~~[[, and less than about]]~~ 40 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector ~~including mounted with~~ a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 25 feet in a storage area having a maximum ceiling height of 30 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

Claim 106. (New) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing

pressure ranging from 20 pounds per square inch to 45 pounds per square inch, at a most hydraulically remote sprinkler; and a

deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

Claim 107. (New) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from 25 pounds per square inch to 50 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

Claim 108. (New) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from 40 pounds per square inch to 65 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a

storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

Claim 109. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the at least two slots of each of the at least two grouping of slots define at least two reentrant slots.

Claim 110. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 109, wherein each of the at least two reentrant slots extend inwardly along reentrant slot centerlines, and each of the at least two reentrant slots has a first width transverse to its reentrant slot centerline in a region of the peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward the deflector axis, relative to the region of the peripheral edge, the second width being greater than the first width.

Claim 111. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the outlet defines an outlet axis and the sprinkler further comprises an apex element defining a curve in the direction of the outlet axis.

Claim 112. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the sprinkler is suited for installation with the deflector disposed up to 18 inches below a ceiling.

Claim 113. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the deflector has a thickness measured from the first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 114. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the outlet defines a longitudinal axis along the sprinkler body, the sprinkler further comprising an apex element aligned with the outlet axis, the deflector mounted to the apex element.

Claim 115. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 114, the body further comprising a pair of arms mounted about the body, the arms joining at the apex element.

Claim 116. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 114, further comprising a plate assembly to close the outlet and a thermally responsive element disposed between the outlet and the apex to support the plate.

Claim 117. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 116, wherein the thermally responsive element comprises a fusible solder alloy.

Claim 118. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 116, wherein the thermally responsive element has a temperature rating between 165 °F (74 °C) and 214 °F (101 °C).

Claim 119. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 116, further comprising a strut and a lever to transfer a force from the thermally responsive element to the plate assembly, the sprinkler further comprising a threaded fastener engaged with the apex to coaxially support the lever.

Claim 120. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the K-factor of the body is 25.2.

Claim 121. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 105, 106, 107, or 108, wherein the first surface opposes the flow of fluid to deflect the flow of fluid to suppress a fire in the at least one of a single rack storage, double row rack storage, and multiple row rack storage, the at least one storage further includes portable storage.

Claim 122. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 121, wherein at least one storage includes at least one of palletized and solid pile storage.

Claim 123. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 122, wherein the at least one storage includes encapsulated or non-encapsulated materials.

Claim 124. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 122, wherein the at least one storage includes cartoned unexpanded plastics.

Claim 125. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 122, wherein the at least one storage includes at least one of Class I, Class II, Class III and Class IV commodities.

Claim 126. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 122, wherein the at least one storage includes at least one of roll paper and rubber tires.

Claim 127. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 107, wherein the minimum design flowing pressure is 40 pounds per square inch.

Claim 128. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 108, wherein the maximum storage height is about 40 feet, the maximum ceiling height is about 45 feet, and the minimum design flowing pressure is 60 pounds per square inch.

Claim 129. (New) An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

- a sprinkler body defining an orifice and an outlet along a longitudinal axis that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a base having a pair of arms diametrically mounted about the base;

- a plate assembly axially aligned and adjacent the outlet, and a thermally responsive element supporting the plate assembly to close the outlet;

- an apex element disposed along the longitudinal axis, the pair of arms being joined at the apex element, the apex element defining a curve in the direction of the longitudinal axis;

- a deflector affixed to the apex element, the deflector including a first surface opposed to the flow of fluid from the outlet, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first

surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length, wherein the first surface being configured to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage, multiple row rack storage and portable row rack storage having a maximum storage height in a storage area having a maximum ceiling height, with no open containers and no solid shelves, the body having a minimum design flowing pressure measured in pounds per square inch at a most hydraulically remote sprinkler for the given maximum storage height and the maximum ceiling height,

wherein when the maximum storage height is about 35 feet and the maximum ceiling height is about 40 feet, the minimum design flowing pressure ranging from 25 pounds per square inch to 50 pounds per square inch, and

wherein when the maximum storage height is about 40 feet and the maximum ceiling height is about 45 feet, the minimum design flowing pressure ranging from 40 pounds per square inch to 65 pounds per square inch.

Claim 130. (New) The early suppression fast response pendant-type fire protection sprinkler of claim 129, wherein the at least two slots of each of the at least two grouping of slots define at least two reentrant slots.

Claim 131. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 130, wherein each of the at least two reentrant slots extend inwardly along reentrant slot centerlines, and each of the at least two reentrant slots has a first width transverse to its reentrant slot centerline in a region of the peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward the deflector axis, relative to the region of the peripheral edge, the second width being greater than the first width.

Claim 132. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein when the maximum storage height is about 35 feet and the maximum ceiling height is about 40 feet, the minimum design flowing pressure being 40 pounds per square inch.

Claim 133. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein when the maximum storage height is about 40 feet and the maximum ceiling height is about 45 feet, the minimum design flowing pressure being 60 pounds per square inch.

Claim 134. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein the sprinkler is suited for installation with the deflector disposed up to 18 inches below a ceiling.

Claim 135. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein the deflector has a thickness measured from the first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

Claim 136. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein the K-factor of the sprinkler body is 25.2.

Claim 137. (New) The early suppression fast response pendent-type fire protection sprinkler of claim 129, wherein the apex element includes a central bore having a threaded fastener disposed therein, the sprinkler further comprising a lever and strut engaged with the thermally responsive element to support the thermally responsive element, the threaded fastener further engaging the lever and strut along the longitudinal axis.

REMARKS

This amendment is being filed with a Request for Continued Examination. Claims 1 and 21-35 were canceled in the Amendment filed June 22, 2004. Claims 2-20 and 36-105 have been allowed pursuant to the Notice of Allowance dated February 09, 2006. Claim 105 has been amended and new claims 106-137 have been newly added for the Examiner's consideration. Applicant respectfully requests reconsideration of the pending claims 2-20 and 36-137.

Claims 106-137 have been added to particularly point out and distinctly claim the subject matter of applicant's invention. In particular, independent claims 106-108 and 129 recite an early suppression fast response ("ESFR") pendent-type fire protection sprinkler that includes, *inter alia*, a deflector. The deflector defines at least two grouping of slots disposed about a deflector axis. Each of the grouping of slots includes at least two slots. Each of the slots in each grouping extends from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis. Each slot of one grouping of the at least two grouping of slots has a first width generally transverse to a first radial length extending perpendicular to the deflector axis. Each slot of another grouping of the at least two grouping of slots has a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length. Support for this amendment and the other newly added claims is provided by the originally-filed application at, for example, pages 13-14, Figures 1 and 2; pages 17-19, Figures 5 and 5A; and page 20, line 10 to page 23, line 14.

Independent claims 106-108 and 129, similar to claim 105, are patentably distinct over U.S. Patent No. 5,820,532 to Meyer *et al.* ("Meyer '532"—as applied in the non-final Office Action dated February 9, 2004 because Meyer '532 shows and describes that the preferred embodiment of the disclosed ESFR sprinkler utilizes slots that have generally the same width and radial length instead of at least two groupings of at least two slots in each grouping, and each of the at least two slots of one grouping has different transverse widths and radial lengths (with respect to a deflector axis) from the at least two slots of the other grouping of slots. For example, as shown in Figure 4 of Meyer '532, deflector 60 provides a plurality of slots 64 that each have the same width generally transverse with respect to a centerline or radial length of each slot extending generally perpendicular to a deflector axis A. The radial length of each slot

Docket No.: 16125:E-US
Application No.: 09/292,152
Page 39 of 39

64 of Meyer '532 is also the same. Accordingly, claims 105-108 and 129 are patentable over Meyer '532 for at least these reasons. Newly added claims 109-128 depend directly or indirectly from claims 105-108 and claims 130-137 depend from claim 129. Thus, claims 109-128 and 130-137 are patentable for at least the same reasons.

Claim 105 has been amended to particularly point out and distinctly claim the subject matter of applicant's invention. Claim 105 now recites "a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire" Reconsideration and allowance of claim 105 is respectfully requested.

CONCLUSION

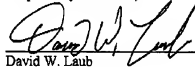
In view of the foregoing, applicant respectfully submits that the pending claims 2-20 and 36-137 are in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the examiner is respectfully requested to contact the undersigned representative to expedite prosecution of the application.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-3081. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Date: May 9, 2006

Proskauer Rose LLP
1001 Pennsylvania Avenue, NW
Suite 400
Washington, DC 20004
Telephone: 202.416.6800
Facsimile: 202.416.6899

Respectfully submitted,



David W. Laub
Attorney for Applicant
Reg. No.: 38,708

Customer No. 60708

EXHIBIT C



NOTICE OF ALLOWANCE AND FEE(S) DUE

26633 7590 08/25/2006

HELLER EHRMAN WHITE & MCAULIFFE LLP
1717 RHODE ISLAND AVE, NW
WASHINGTON, DC 20036-3001

EXAMINER

NGUYEN, DINH Q

ART UNIT

PAPER NUMBER

3752

DATE MAILED: 08/25/2006

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/292,152

04/15/1999

MICHAEL A. FISCHER

42366-4009 US

3148

TITLE OF INVENTION: EARLY SUPPRESSION FAST RESPONSE FIRE PROTECTION SPRINKLER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$0	\$1240	\$1400	11/27/2006

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
 or **Fax** **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmittal.

26633 7590 08/25/2006

HELLER EHRMAN WHITE & MCAULIFFE LLP
 1717 RHODE ISLAND AVE, NW
 WASHINGTON, DC 20036-3001

Certificate of Mailing or Transmittal

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/292,152 04/15/1999 MICHAEL A. FISCHER 42366-4009.US 3148

TITLE OF INVENTION: EARLY SUPPRESSION FAST RESPONSE FIRE PROTECTION SPRINKLER

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1400 \$0 \$1240 \$1400 11/27/2006

EXAMINER	ART UNIT	CLASS-SUBCLASS
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NGUYEN, DINH Q 3752 169-037000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered attorney or agent, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/292,152	04/15/1999	MICHAEL A. FISCHER	42366-4009.US	3148
26633	7590	08/25/2006	EXAMINER	
HELLER EHRMAN WHITE & MCAULIFFE LLP 1717 RHODE ISLAND AVE, NW WASHINGTON, DC 20036-3001			NGUYEN, DINH Q	
			ART UNIT	PAPER NUMBER

3752

DATE MAILED: 08/25/2006

Determination of Patent Term Extension under 35 U.S.C. 154 (b)

(application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

09/292,152

Examiner

Dinh Q. Nguyen

Applicant(s)

FISCHER, MICHAEL A.

Art Unit

3752

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address-

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to filing of RCE on 5/09/06.
2. ☒ The allowed claim(s) is/are 2-20 and 36-137.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____.
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION***Allowable Subject Matter***

1. The following is an examiner's statement of reasons for allowance: The prior art fails to disclose or render obvious the claimed combination including: an early suppression fast response (ESFR) sprinkler having a body with an orifice and K factor of 25 and flow pressure between 15 psi-40 psi; a deflector having a first surface, at least two reentrant slots disposed in opposition about a deflector axis and extending from the first surface through the deflector, and the reentrant slots extending from slot openings at an outer peripheral edge toward the deflector axis.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

Conclusion

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to show the art with respect to an ESFR sprinkler: Meyer et al., and Fischer.
3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dinh Q. Nguyen whose telephone number is 571-272-4907. The examiner can normally be reached on Monday-Thursday 6:00-4:30.

Art Unit: 3752

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Scherbel can be reached on 571-272-4919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Dinh Q. Nguyen
Primary Examiner
Art Unit 3752

dqn

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 10

PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 25, line 22, that portion of claim 89 reading "of about 15" should read --ranging from 15--;
line 23, that portion of claim 89 reading ", and less than about 40" should read --to 40--.

Column 26, line 1, that portion of claim 89 reading "mounted with" should read --including--; line 24, insert the following claims, claim 90 to claim 121:

--90. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the at least two slots of each of the at least two grouping of slots define at least two reentrant slots.

91. The early suppression fast response pendent-type fire protection sprinkler of claim 90, wherein each of the at least two reentrant slots extend inwardly along reentrant slot centerlines, and each of the at least two reentrant slots has a first width transverse to its reentrant slot centerline in a region of the peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward the deflector axis, relative to the region of the peripheral edge, the second width being greater than the first width.

92. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the outlet defines an outlet axis and the sprinkler further comprises an apex element defining a curve in the direction of the outlet axis.

93. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the sprinkler is suited for installation with the deflector disposed up to 18 inches below a ceiling.

94. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the deflector has a thickness measured from the first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Tyco Engineered Products & Services
9 Rozsel Road
Princeton, NJ 08540

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 2 of 10

PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

95. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the outlet defines a longitudinal axis along the sprinkler body, the sprinkler further comprising an apex element aligned with the outlet axis, the deflector mounted to the apex element.

96. The early suppression fast response pendent-type fire protection sprinkler of claim 95, the body further comprising a pair of arms mounted about the body, the arms joining at the apex element.

97. The early suppression fast response pendent-type fire protection sprinkler of claim 95, further comprising a plate assembly to close the outlet and a thermally responsive element disposed between the outlet and the apex to support the plate.

98. The early suppression fast response pendent-type fire protection sprinkler of claim 97, wherein the thermally responsive element comprises a fusible solder alloy.

99. The early suppression fast response pendent-type fire protection sprinkler of claim 97, wherein the thermally responsive element has a temperature rating between 165 °F (74 °C) and 214 °F (101 °C).

100. The early suppression fast response pendent-type fire protection sprinkler of claim 97, further comprising a strut and a lever to transfer a force from the thermally responsive element to the plate assembly, the sprinkler further comprising a threaded fastener engaged with the apex to coaxially support the lever.

101. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the K-factor of the body is 25.2.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Tyco Engineered Products & Services
9 Rozsel Road
Princeton, NJ 08540

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 3 of 10

PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

102. The early suppression fast response pendent-type fire protection sprinkler of claim 89, 108, 109, or 111, wherein the first surface opposes the flow of fluid to deflect the flow of fluid to suppress a fire in the at least one of a single rack storage, double row rack storage, and multiple row rack storage, the at least one storage further includes portable storage.

103. The early suppression fast response pendent-type fire protection sprinkler of claim 102, wherein at least one storage includes at least one of palletized and solid pile storage.

104. The early suppression fast response pendent-type fire protection sprinkler of claim 103, wherein the at least one storage includes encapsulated or non-encapsulated materials.

105. The early suppression fast response pendent-type fire protection sprinkler of claim 103, wherein the at least one storage includes cartoned unexpanded plastics.

106. The early suppression fast response pendent-type fire protection sprinkler of claim 103, wherein the at least one storage includes at least one of Class I, Class II, Class III and Class IV commodities.

107. The early suppression fast response pendent-type fire protection sprinkler of claim 103, wherein the at least one storage includes at least one of roll paper and rubber tires.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Tyco Engineered Products & Services
9 Rozzel Road
Princeton, NJ 08540

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 4 of 10

PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

108. An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from 20 pounds per square inch to 45 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 30 feet in a storage area having a maximum ceiling height of 35 feet, with no open containers and no solid shelves, the deflector defining at least two groupings of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

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PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

109. An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from 25 pounds per square inch to 50 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 35 feet in a storage area having a maximum ceiling height of 40 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two grouping of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

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PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

110. The early suppression fast response pendent-type fire protection sprinkler of claim 109, wherein the minimum design flowing pressure is 40 pounds per square inch.

111. An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a minimum design flowing pressure ranging from 40 pounds per square inch to 65 pounds per square inch, at a most hydraulically remote sprinkler; and

a deflector including a first surface opposed to the flow of fluid from the outlet to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage and multiple row rack storage having a maximum storage height of 40 feet in a storage area having a maximum ceiling height of 45 feet, with no open containers and no solid shelves, the deflector defining at least two grouping of slots disposed about a deflector axis, each of the at least two groupings of slots having at least two slots, each of the slots in each of the at least two grouping of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length.

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PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

112. The early suppression fast response pendent-type fire protection sprinkler of claim 111, wherein the maximum storage height is about 40 feet, the maximum ceiling height is about 45 feet, and the minimum design flowing pressure is 60 pounds per square inch.

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

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PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

113. An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C, the sprinkler comprising:

a sprinkler body defining an orifice and an outlet along a longitudinal axis that delivers a flow of fluid from a source, the sprinkler body having a K-factor of about 25 and a base having a pair of arms diametrically mounted about the base;

a plate assembly axially aligned and adjacent the outlet, and a thermally responsive element supporting the plate assembly to close the outlet;

an apex element disposed along the longitudinal axis, the pair of arms being joined at the apex element, the apex element defining a curve in the direction of the longitudinal axis;

a deflector affixed to the apex element, the deflector including a first surface opposed to the flow of fluid from the outlet, the deflector defining at least two groupings of slots disposed about a deflector axis, each of the at least two groupings of slots having at least two slots, each of the slots in each of the at least two groupings of slots extending from the first surface through the deflector, and from slot openings at an outer peripheral edge of the deflector inwardly from the peripheral edge toward the deflector axis, each slot of one grouping of the at least two groupings of slots having a first width generally transverse to a first radial length extending perpendicular to the deflector axis, each slot of another grouping of the at least two groupings of slots having a second width different than the first width and generally transverse to a second radial length extending perpendicular to the deflector axis that is different than the first radial length, wherein the first surface being configured to deflect the flow of fluid to suppress a fire in at least one of a single row rack storage, double row rack storage, multiple row rack storage and portable row rack storage having a maximum storage height in a storage area having a maximum ceiling height, with no open containers and no solid shelves, the body having a minimum design flowing pressure measured in pounds per square inch at a most hydraulically remote sprinkler for the given maximum storage height and the maximum ceiling height,

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

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PATENT NO. : 7,165,624
APPLICATION NO.: 09/292152
ISSUE DATE : January 23, 2007
INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

113. (Cont'd)

wherein when the maximum storage height is about 35 feet and the maximum ceiling height is about 40 feet, the minimum design flowing pressure ranging from 25 pounds per square inch to 50 pounds per square inch, and

wherein when the maximum storage height is about 40 feet and the maximum ceiling height is about 45 feet, the minimum design flowing pressure ranging from 40 pounds per square inch to 65 pounds per square inch.

114. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein the at least two slots of each of the at least two grouping of slots define at least two reentrant slots.

115. The early suppression fast response pendent-type fire protection sprinkler of claim 114, wherein each of the at least two reentrant slots extend inwardly along reentrant slot centerlines, and each of the at least two reentrant slots has a first width transverse to its reentrant slot centerline in a region of the peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward the deflector axis, relative to the region of the peripheral edge, the second width being greater than the first width.

116. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein when the maximum storage height is about 35 feet and the maximum ceiling height is about 40 feet, the minimum design flowing pressure being 40 pounds per square inch.

117. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein when the maximum storage height is about 40 feet and the maximum ceiling height is about 45 feet, the minimum design flowing pressure being 60 pounds per square inch.

118. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein the sprinkler is suited for installation with the deflector disposed up to 18 inches below a ceiling.

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PATENT NO. : 7,165,624
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INVENTOR(S) : Fischer

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

119. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein the deflector has a thickness measured from the first surface in the direction of fluid flow equal to or greater than about 0.06 inch.

120. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein the K-factor of the sprinkler body is 25.2.

121. The early suppression fast response pendent-type fire protection sprinkler of claim 113, wherein the apex element includes a central bore having a threaded fastener disposed therein, the sprinkler further comprising a lever and strut engaged with the thermally responsive element to support the thermally responsive element, the threaded fastener further engaging the lever and strut along the longitudinal axis.--

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